



MANAGEMENT GUIDELINES FOR ILLINOIS NATURE PRESERVES

MOSQUITO CONTROL

BACKGROUND

_____ Mosquito problems can be placed into two distinct categories. The most serious are those associated with the transmission of pathogens causing diseases in humans and animals. The second category are those which cause a nuisance due to their biting behavior and, in many cases when mosquito numbers are high, could present a potential health threat. It is important to discriminate between these two categories of mosquito problems in developing a sound management response.

Only certain species of mosquito are capable of serving as carriers (vectors) of pathogens causing diseases in humans or animals. In Illinois there are three primary diseases transmitted by mosquitoes, two to humans and one to animals; St. Louis and LaCrosse Encephalitis viruses and Dog Heartworm, respectively. Several species in the *Culex pipiens* complex of mosquitoes transmit St. Louis Encephalitis to humans and Dog Heartworm primarily to domesticated dogs. LaCrosse Encephalitis is transmitted by *Aedes triseriatus*.

Recently the Asian Tiger mosquito *Aedes albopictus* has become established in Illinois, brought into the State in used tires. Although used tires are one of the primary habitats for this mosquito, it can also invade naturally wooded areas both urban and rural where it inhabits water-filled treeholes. This species is capable of transmitting all three of the above pathogens to humans and animals.

In addition, species in the genus *Anopheles* (of which there are two in Illinois) transmit malaria, and Eastern Equine Encephalitis (EEE) is occasionally transmitted to humans by *Aedes vexans*.

The *Culex pipiens* complex of mosquitoes is composed of three species and one subspecies. It includes *Culex pipiens pipiens*, *Culex pipiens quinquefasciatus*, *Culex restuans*, and *Culex salinarius*. *Culex p. pipiens* and *Culex p. quinquefasciatus* are the primary vectors of St. Louis Encephalitis (SLE) virus and Dog Heartworm in Illinois. *Culex restuans* is considered an "amplification vector" since it feeds on birds exclusively and builds up this virus in the bird population. *Culex p. pipiens* and *Culex p. quinquefasciatus* then move the virus from bird to humans. The role of *Culex salinarius* in the transmission of SLE virus is still uncertain although highly suspect.

The larvae and eggs of mosquitoes that transmit human diseases occur in a number of different aquatic habitats, both longstanding and temporary, throughout Illinois. Since all adult mosquitoes can fly, their distribution can be extensive and many times far removed from their aquatic source.

The habitats for larvae and eggs of the *Culex pipiens* complex mosquitoes range from artificial water holding containers to ponds and marshes with a high humus load. *Culex p. pipiens* and *Culex p. quinquefasciatus* are both domestic or semi-domestic species found in number



in sewage lagoons, rain gutters, buckets, roadside ditches, and streams polluted by run-off. It is generally thought that this complex of mosquitoes can fly up to 10 to 15 miles from their aquatic habitat source.

An additional consideration in developing a management response to mosquito problems is the appropriateness of the control measure. There are essentially two approaches in mosquito control: adulticiding and larviciding. Take the case of a “hatch” of *A. vexans*: since most of the eggs would be hatched before any response could be made, use of a larvicide would be ineffective. Furthermore in the absence of EEE viral activity, an adulticiding program (Ultra-Low Volume aerial spray) would not be warranted in a nature preserve.

Larvicides are available in several forms (listed as follows generally in decreasing order of threat to natural ecosystems): chemical pesticides can directly kill the larvae and pupae; surface treatments (light surface oils) can block siphons and suffocate larvae and pupae; synthetic growth hormones (e.g. ALTOSID) can disrupt transformation from larva to pupa and *Bacillus thuringiensis israelensis* (BTI, a bacteria) or extracts therefrom can be used a biological control agent against larvae. All of these pose some threat to non-target species; even the biological agent BTI also attacks blackflies and possibly other diptera. It should also be remembered that the best larvicides are natural predators. However, bodies of water harboring fish populations may generate significant numbers of mosquitos, and sizeable mosquito populations may occur in very shallow, seasonal standing water.

The logical sequence in developing a management response is to:

1. Verify that the source of those mosquitos is the Nature Preserve.
2. Determine which species of mosquitos are involved.
3. Determine if a threat to health is posed by those species.
4. Evaluate treatment options; determine if treatment of the source on the Nature Preserve threatens other fauna or flora.

Remember, few natural aquatic ecosystems will generate large number of mosquitos of species that pose a threat to human health!! Also don't overlook permanent solutions while taking advantage of a “quick fix.” For example, many *A. vexans* problems are a result of altered natural drainage, and *C. pipiens* problems can often be eliminated by halting inputs of organic wastes. The general provisions below are based on the assumption that an analysis like that above has taken place and the need for control has been verified.

GENERAL PROVISIONS

Medical Emergencies

- If: a). Evidence of pathogen transmission or activity exists in the region of a Preserve,
and
- b). Evidence suggests that a source or sources of involved species occur on a Preserve,

then those sources may be treated with BTI with approval of the owner and the Commission. The use of aerial application of chemical insecticides is only warranted where the threat of human morbidity or mortality is judged to be direct and imminent.

Equal opportunity to participate in programs of the Illinois Nature Preserves Commission (INPC), Illinois Department of Natural Resources (IDNR) and those funded by the U.S. Fish and Wildlife Service and other agencies is available to all individuals regardless of race, sex, national origin, disability, age, religion or other non-merit factors. If you believe you have been discriminated against, contact the funding source's civil rights office and/or the Equal Employment Opportunity Officer, IDNR, One Natural Resources Way, Springfield, Ill. 62702-1271; 217/785-0067; TTY 217/782-9175.